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EXAMINER

RUTTEN, JAMES D

ART UNIT

PAPER NUMBER

2122

DATE MAILED: 09/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/992,558

Applicant(s)

KRISHNA ET AL.

Examiner

J. Derek Rutten

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-79 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-79 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-79 have been examined.

Drawings

2. Figures 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application.

The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. FIG. 5 element 510 contains text which is unreadable. This element corresponds with text on page 7 lines 7-9 of the originally filed specification, and will be interpreted as "Start Pointer ≤FLR Pointer". A corrected drawing is required.

Specification

4. The use of the trademark "Java Card" has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 4, 10, 19, 25, 32, 38, 48, 55, 66, and 73 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Although reference is made to the step of resolving on pages 6-8, the description of this step was not provided in a manner that would enable one to make and/or use the invention. The specification appears to suggest on pages 4 and 5 that the provided method of partitioning code permits resolution of unresolved references without using relocation annotations. However, it is unclear from the description how sequential examination of instructions permits this.
7. Claims 5, 6, 11, 12, 20, 21, 26, 27, 33, 34, 39, 40, 49, 50, 56, 57, 67, 68, 74, and 75 are rejected under 35 U.S.C. 112, first paragraph, as being dependent upon a rejected base claim.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-43, and 62-79 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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10. Claims 1, 16, 29, 62, and 77 use the acronym "FLR". This acronym is not generally known or used and should be spelled out where it is first used to avoid confusion. Interpretation will be made in light of the originally filed specification on page 6 line 12, to refer to "farthest logical return".

11. Claims 2-15, 17-28, 30-43, 63-76, 78 and 79 are rejected as being dependent upon a rejected base claim.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 1-3, 16-18, 44-47, and 62-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Bytecode-based Java Program Analysis" by Lance et al. (hereinafter "Lance") in view of U.S. Patent 5,075,848 to Lai et al. (hereinafter "Lai").

As per claim 1, Lance discloses:

A method for determining instruction boundaries of at least one method body

(page 3 Section 3.2: "Our partitioning algorithm is an extension of the algorithm given by Aho, Sethi, and Ullman...") *within a computer code loaded into a memory of a smart card comprising:*

*a) examining in a sequential manner, each instruction of the at least one method body starting with a first instruction of the at least one method body (Section 3.2 paragraph 2: “An instruction is considered a leader if the instruction is the first instruction...” Note that examination of each instruction is an inherent quality of the algorithm, since missing an instruction could mean the improper partitioning of the method.), for an instruction selected from a group consisting of a forward jump instruction and a valid ending instruction (page 3, Section 3.2, paragraph 2: “the instruction is the target of a **conditional or unconditional branch instruction...**” Note that a method return instruction, or “valid ending instruction” is an unconditional branch instruction.); and*

c) terminating the examining for a forward jump or a valid ending instruction when the instruction under examination is beyond the instruction corresponding to the FLR Pointer (Section 3.2 paragraph 3: “After identifying leaders, our algorithm partitions the code into basic blocks. A basic block is defined as consisting of the leader instruction and all instructions up to but not including the next leader instruction.” Note that determination of a basic block inherently requires that examination of instructions in a block ceases once all instructions “up to but not including the next leader instruction” have been examined. That is, determination of a first block is complete once the leader of a second block is encountered.).

Lance does not expressly disclose *b) maintaining a FLR (“Farthest Logical Return”) Pointer corresponding to the instruction of the at least one method body for*

which the farthest forward jump instruction or the farthest valid ending instruction is detected;

However, in an analogous environment, Lai teaches the process of saving pointers to a memory range, and comparing them with object reference addresses to ensure that references do not go beyond a certain bounds (column 7 lines 5-11: "The object offset (22) in a virtual address (20) plus the operand size is compared with the size of the referenced object on every address translation. This operation is called bounds checking and prevents reference beyond the specified object of a datum which may belong to another object.").

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Lai's teaching of bounds checking in Lance's algorithm. One of ordinary skill would have been motivated to track a memory address corresponding to a logical boundary to enhance the analysis of a method, and to avoid inadvertent programming errors.

As per claim 2, the rejection of claim 1 is incorporated. Lance further discloses: *d) setting a Start Pointer to a next method body of the at least one method body following the instruction corresponding to the FLR Pointer* (Section 3.2 paragraph 1: "A scan is performed for each method in the class..."). Lai provides motivation for using pointers to track memory addresses as addressed in the rejection of claim 1.

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As per claim 3, the rejection of claim 2 is incorporated. All further limitations have been addressed in the above rejection of claim 2.

As per claim 16, official notice is taken that the use of a computer-readable medium is well known by those of ordinary skill in the art. A computer-readable medium provides storage and distribution of computer software. All further limitations have been addressed in the above rejection of claim 1.

As per claims 17 and 18, the above rejection of claim 16 is incorporated. All further limitations have been addressed in the above rejections of claims 2 and 3, respectively.

As per claims 44 and 45, all limitations have been addressed in the above rejection of claim 1.

As per claims 46, and 47, the above rejection of claim 44 is incorporated. All further limitations have been addressed in the above rejections of claims 2 and 3, respectively.

As per claims 62-65, all limitations have been addressed by the above rejection of claims 1-3.

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14. Claims 4-6, 19-21, 48-50, and 66-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance and Lai as applied to claim 1 above, and further in view of prior art of record WO 99/49392 by Baentsch et al. (hereinafter "Baentsch").

As per claim 4, the above rejection of claim 1 is incorporated. Further, Lance and Lai do not expressly disclose: *d) resolving each unresolved reference in each instruction of the at least one method body starting with the first instruction of the at least one method body and ending with the instruction corresponding to the FLR Pointer.*

However, in an analogous environment, Baentsch teaches a method of resolving unresolved references in a method (page 3 lines 18-21. Note that each unresolved reference in each instruction must be resolved since the program would not function properly if a reference were left unresolved.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Baentsch's teaching of reference resolution in Lance's instruction identification method. One of ordinary skill would have been motivated to prepare a bytecode file for execution by replacing unresolved references with the proper runtime addresses so that the correct data and instruction references could be accessed.

As per claims 5 and 6, the above rejection of claim 4 is incorporated. All further limitations have been addressed in the above rejection of claim 2.

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As per claims 19-21, 48-50, and 66-68, the above rejection of claims 16, 44, and 62 are respectively incorporated. All further limitations have been addressed in the above rejections of claims 4-6, respectively.

15. Claims 7-9, 15, 22-24, 51-54, 61, and 69-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance and Lai as applied to claim 1 above, and further in view of “Java Card 2.1 Virtual Machine Specification” by Sun Microsystems (hereinafter “JCVMS 2.1”).

As per claim 7, the above rejection of claim 1 is incorporated. Lance and Lai disclose or teach examining instructions of a method body for a forward jump instruction and a valid ending instruction, using a pointer to track the furthest logical return, and terminating examination upon completion as addressed in the above rejection of claim 1. Lance and Lai do not expressly disclose:

d) determining if an exception handler code corresponding to the at least one method body is present; and

e) responsive to determining that an exception handler code corresponding to the at least one method body is present beyond the instruction corresponding to the FLR

Pointer:

(i) examining in a sequential manner each instruction of the exception handler code corresponding to the at least one method body.

However, in an analogous environment, JCVMS teaches that a correct implementation of a Java Card Virtual Machine requires proper handling of exceptions

and their associated implementation code (See page 20, Section 2.3.3, and page 28, Section 3.8). Determination of exception handler code is required by the specification. A response to the determination is also required by the specification. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the teaching of JCVMS with Lance's resolving method. One of ordinary skill would have been motivated to examine all code in a program in order to implement exceptions according to a standard specification.

As per claims 8 and 9, the above rejection of claim 7 is incorporated. All further limitations have been addressed in the above rejections of claims 2 and 3.

As per claim 15, the above rejection of claim 1 is incorporated. Lance and Lai do not expressly disclose: *wherein the memory comprises non-volatile read/write memory*.

However, JCVMS 2.1 teaches the use of non-volatile read/write memory on a typical resource-constrained device (page 7, Section 2.1 paragraph 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the non-volatile memory of JCVMS 2.1 with Lance's code. One of ordinary skill would have been motivated to use a typical resource-constrained device to execute specialized code specifically developed to run on it.

As per claims 22-24, the above rejection of claim 16 is incorporated. All further limitations have been addressed in the above rejections of claims 7-9, respectively.

As per claims 51, 52, and 61, the above rejection of claim 44 is incorporated. All further limitations have been addressed in the above rejection of claims 7 and 15, respectively.

As per claims 53 and 54, the above rejection of claim 51 is incorporated. All further limitations have been addressed in the above rejection of claims 8 and 9, respectively.

As per claim 69 and 70, the above rejection of claim 62 is incorporated. All further limitations have been addressed in the above rejection of claim 7.

As per claims 71 and 72, the above rejection of claim 69 is incorporated. All further limitations have been addressed in the above rejection of claims 8 and 9, respectively.

16. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lance and Lai as applied to claim 1 above, and further in view of prior art of record "Java Card 2.1.1 Virtual Machine Specification" by C.S. Dept. Univ. of Augsburg (hereinafter "JCVMS 2.1.1").

As per claim 14, the above rejection of claim 1 is incorporated. Lance and Lai do not expressly disclose: *wherein the computer code comprises a methods item of a method component of a converted applet file.*

However, JCVMS 2.1.1 teaches the use of a method item of a method component of a converted applet file (pages 92-96, Section 6.9). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the teaching of JCVMS 2.1.1 with Lance's code partitioning method. One of ordinary skill would have been motivated to partition code that adheres to a standard specification, for the purpose of analysis and execution.

17. Claims 10-12, 25-27, 55-57, and 73-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance, Lai, and JCVMS as applied to claim 7 above, and further in view of Baentsch.

As per claims 10-12, the above rejection of claim 7 is incorporated. All further limitations have been addressed in the above rejections of claims 4, 2, and 3, respectively.

As per claims 25-27, 55-57, and 73-75, the above rejections of claims 22, 51, 69 are respectively incorporated. All further limitations have been addressed in the above rejections of claims 10-12, respectively.

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18. Claims 13, 28, 58, and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance, Lai, and JCVMS 2.1 as applied to claims 7, 22, 35, 51, and 69, respectively above, and further in view of prior art of record JCVMS 2.1.1 and further in view of “The Java Virtual Machine Specification” by Lindholm and Yellin (hereinafter “Lindholm”).

As per claim 13, the above rejection of claim 7 is incorporated. Lance does not expressly disclose a method for handling exceptions. However, JCVMS 2.1 teaches that exceptions are handled in the same fashion as the Java Virtual Machine (page 28 Section 3.8). The Java Virtual Machine is taught by Lindholm. Further, JCVMS 2.1.1 teaches an exception handler array (page 93 “exception_handlers”), and determination of a catch range (page 94 “exception_handler_info”: start_offset and active_length). Further, Lindholm teaches the determination of instructions corresponding to a catch range (JVM Section 3.10 paragraph 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Lindholm’s teaching of exception handling with Lance’s code partitioning. One of ordinary skill would have been motivated to partition code in a manner that would conform to a published specification.

As per claims 28, 58, and 76, the above rejections of claims 22, 51, and 69 are respectively incorporated. All further limitations have been addressed in the above rejection of claim 13.

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19. Claim 29-31, 59, and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance and Lai as applied to claim 1 above, and further in view of "Java Card Technology for Smart Cards" by Chen (hereinafter "Chen").

As per claim 29, Chen teaches:

A smart card configured to receive computer code (page 35 Figure 3.3) having at least one method body within the computer code comprising:

a memory (page 29 Section 3.1 paragraph 1);

a processor connected to the memory (Section 1.1); and

an installer module having logic operable to cause the processor to receive the computer code into the memory (page 35 paragraph 1 and Figure 3.3);

All further limitations have been addressed in the above rejection of claim 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Chen's teaching of a smart card with Lance's code partitioning method. One of ordinary skill would have been motivated to provide a secure, portable, and easy to use system of computation.

As per claims 30-31, the above rejection of claim 29 is incorporated. All further limitations have been addressed in the above rejections of claims 2 and 3, respectively.

As per claims 59 and 77, all limitations have been addressed by the above rejection of claim 29.

20. Claims 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance, Lai, and Chen as applied to claim 29 above, and further in view of Baentsch.

As per claims 32-34, the above rejection of claim 29 is incorporated. All further limitations have been addressed in the above rejection of claims 4-6, respectively.

21. Claims 35-37, 43, and 79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance, Lai, and Chen as applied to claims 29 and 77 above, and further in view of JCVMS 2.1.

As per claims 35-37 and 43, the above rejection of claim 29 is incorporated. All further limitations have been addressed in the above rejections of claims 7-9 and 15, respectively.

As per claim 79, the above rejection of claim 77 is incorporated. All further limitations have been addressed in the above rejection of claim 15.

22. Claims 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance, Lai, Chen, and JCVMS 2.1 as applied to claim 35 above, and further in view of Baentsch.

As per claims 38-40, the above rejection of claim 35 is incorporated. All further limitations have been addressed in the above rejections of claims 10-12, respectively.

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23. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lance, Lai, Chen and JCVMS 2.1 as applied to claim 35 above, and further in view of Lindholm.

As per claim 41, the above rejection of claim 35 is incorporated. All further limitations have been addressed in the above rejection of claim 13.

24. Claims 42, 60, and 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lance, Lai and Chen as applied to claim 29 above, and further in view of JCVMS 2.1.1.

As per claims 42, 60, and 78, the above rejection of claims 29, 59, and 77 are respectively incorporated. All further limitations have been addressed in the above rejection of claim 14.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. Derek Rutten whose telephone number is (703) 605-5233. The examiner can normally be reached on M-F 6:30-3:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (703) 305-4552. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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After October 28, 2004, examiner can be reached at new telephone number (571) 272-3703, and the examiner's supervisor, Tuan Q. Dam can be reached at (571) 272-3694

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jdr



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